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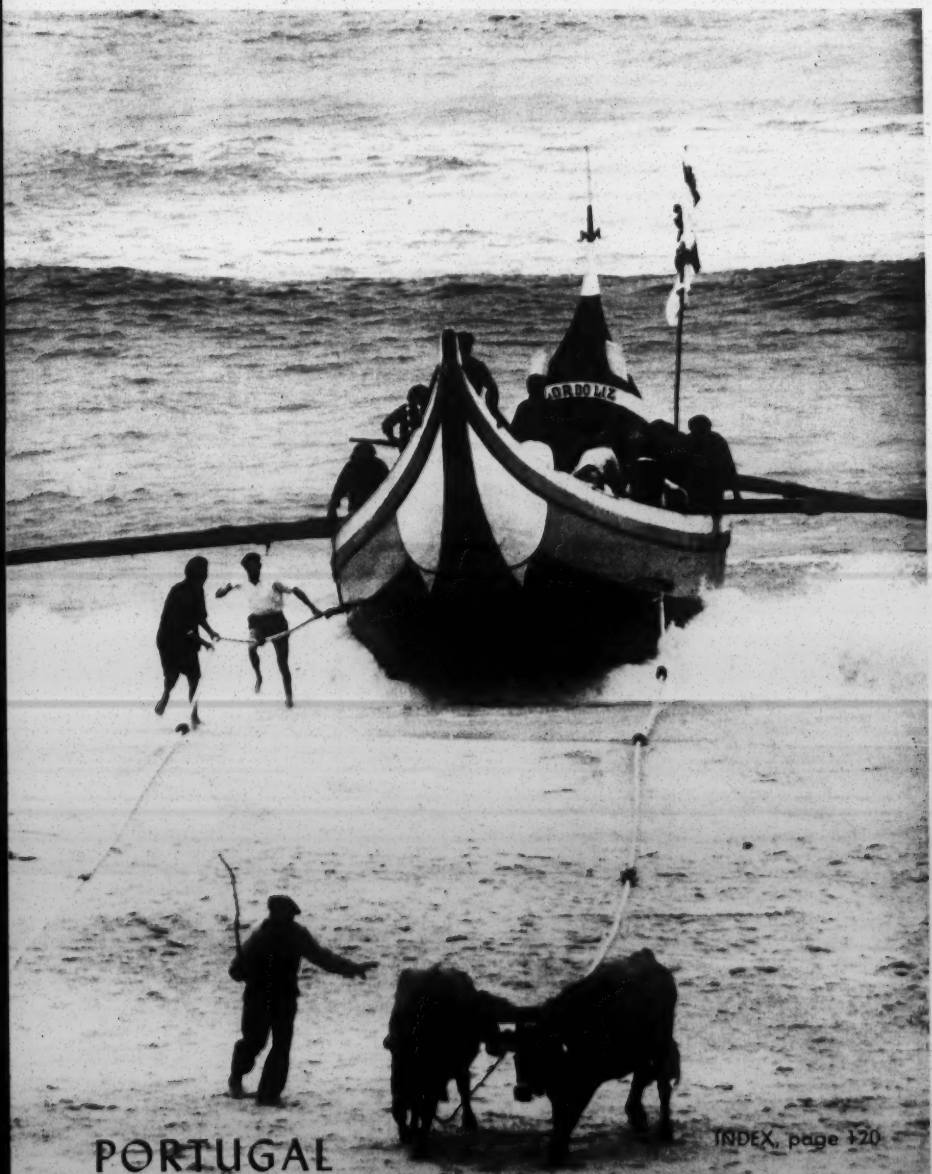

PORTUGAL

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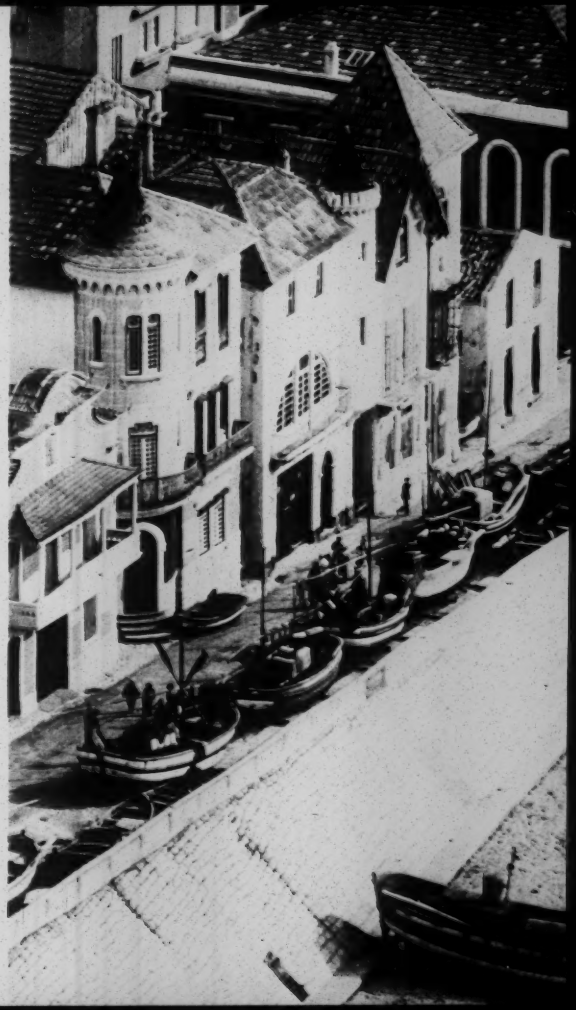
and relatives who lost their battle with wind and wave. When stormy seas lash golden beaches, the high sea wall of Nazaré, right, protects the bathtub-shaped boats parked on rollers. In Lisbon, flower-garlanded national capital, fishwives rush along the streets, cargoes of fresh fish on their heads.

Whole villages, singing and laughing, wade fully clothed into the surf on northern beaches. With scoops that look like giant butterfly nets, they gather seaweed to be turned into fertilizer. Off the southern coast, fishermen trap tuna on their spring run to Mediterranean spawning grounds.

In the 15th century, Portuguese daring on the seas built a world power out of all proportion to the homeland's size. Wedged into the southwestern part of the Iberian Peninsula, the nation covers only 35,600 square miles—a little more than Maine. But two of its sides edge the Atlantic, giving the country a coastline of 485 miles, facing seemingly infinite horizons, making it a gateway to the oceans.

By the 16th century, Portugal ruled more than half the known world. The men of this seafaring nation opened up much of it—Dias, sailing around the Cape of Good Hope, Da Gama venturing by sea as far as India, Cabral discovering Brazil, Magellan circumnavigating the globe.

Although Portuguese power has declined, even today her empire spreads over 23 times as much land as the mother country. It embraces the Azores, Madeira, and Cape Verde Islands; São Tomé, Príncipe, and mainland Portuguese Guinea, Angola, and Mozambique; Damão, Diu, and Goa on the west coast of India; Macao in China; and Timor in Indonesia. Signs of Portuguese presence remain stuck to alien landscapes. Indians call one of their boats a *nau*, Portuguese word for ship. A Por-



Portugal

Historic Nation Cherishes Legacy of Sail and Soil

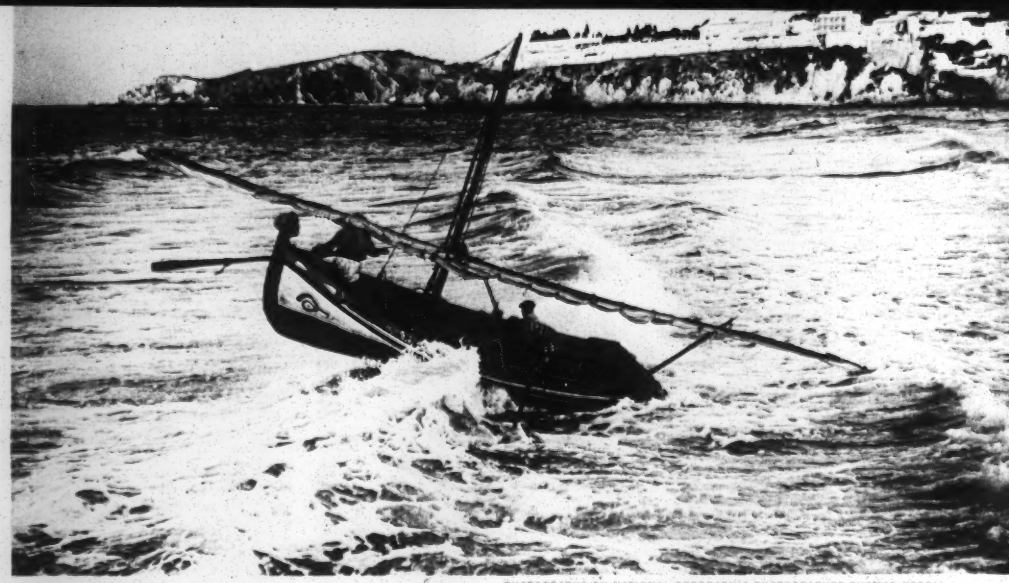
BUFFETED by Atlantic swells, oars sweeping rapidly to escape the approaching storm, the fishing boat slides stern first toward home—Albufeira on the southern coast of Portugal.

The eye painted on the bow—a good luck charm of ancient origin—scanned the sea for fish and kept the tiny boat from losing its way as the men tended their lines all night.

As long as man's memory runs, the skilled fishermen of Portugal have reaped bounteous harvests in the Atlantic. From the coasts and high seas these hunters of the deep feed their countrymen with sardines, tuna, and cod.

For four and a half centuries the Portuguese have set sail on the spring east wind to fish the Grand Banks off Newfoundland, 2,000 miles away.

The years have brought more efficient ways to fish—electronic finders, underwater television, fine-mesh trawls. But many men still pit their skill and naked strength against the sea, using the methods of their grandfathers.



PHOTOGRAPHS BY NATIONAL GEOGRAPHIC PHOTOGRAPHER THOMAS NEBBIA

Rowing with huge sweeps made of pine logs, they brave the Atlantic in engineless boats whose high prows look as if they had sailed out of the past. No docks harbor the big boats after the day's fishing. The brute strength of men and oxen, like those on the cover, at Vieira, drags ships from the thundering surf. Then men and animals heave to on gigantic sardine nets, like the one at right being carried across the beach at Lagos, and pull them up on the beach to dry.

The old ways, the Portuguese believe, are the proper ones. They yield a sufficient supply of fish, yet do not deplete the stock seriously.

The sea permeates the lives of all who live along the coast, as it has for centuries. Children play with toy boats on cobblestone streets. Men usually are dressed in black—mourning color worn in memory of friends

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fishermen live off the land as farmers and foresters. Fertile valleys and sun-swept slopes pasture cattle and sheep. Corn, wheat, oats, and barley fill the fields. The sickle-swinging farmers at left harvest barley near Mafra. In the south, almond, fig, orange, lemon, tangerine, and olive trees shade the lowlands.

In the Alentejo provinces, south of the Tagus River, forests of cork oak trees dot the land. Hogs feed on their bitter acorns. Axmen climb the trees and strip away the cork bark without killing the trees (far left). In factories the cork is boiled, dried, boiled again, then cut into squares. From these, bottle corks are fashioned by machines. One process shaves blocks of cork 1/300th of an inch thick for cigarette tips.

Cork also goes into life jackets, soundproofing, insulation for roofs and refrigerators, and gaskets to seal engine parts against water, oil, and gasoline.

For more than 2,000 years farmers have cultivated succulent grapes and turned their juice into wine, particularly port. Along the Douro River hillsides are terraced to the skies. The granite walls that form the terraces were dragged into place by hand. So was the soil. Spring rains often wash both walls and soil away, and young men put them back in place in the same backbreaking way.

Men press the grapes as their ancestors did for countless generations. Barefooted and barelegged, they lock arms and tread back and forth crushing the grapes, often accompanied by accordion music. This method, the Portuguese say, crushes the grapes evenly and keeps the new wine in steady movement. Machines, they feel, cannot do as well.

Sailboats carry the vintage downstream to coastal Pôrto at the mouth of the Douro where it is exported to world customers. Port wine was named for this city. Portugal itself took its name from an earlier name of the same city—*Portus Cale*, the port of Cale, which abbreviated to *Portucale*.

Most of the nation's minerals remain undeveloped. Portugal's main industries stem from soil and sea—wine making, sardine packing, manufacture of olive oil, flour, and finished cork, and, always, the building of ships—like those above at Portimão. L.B.

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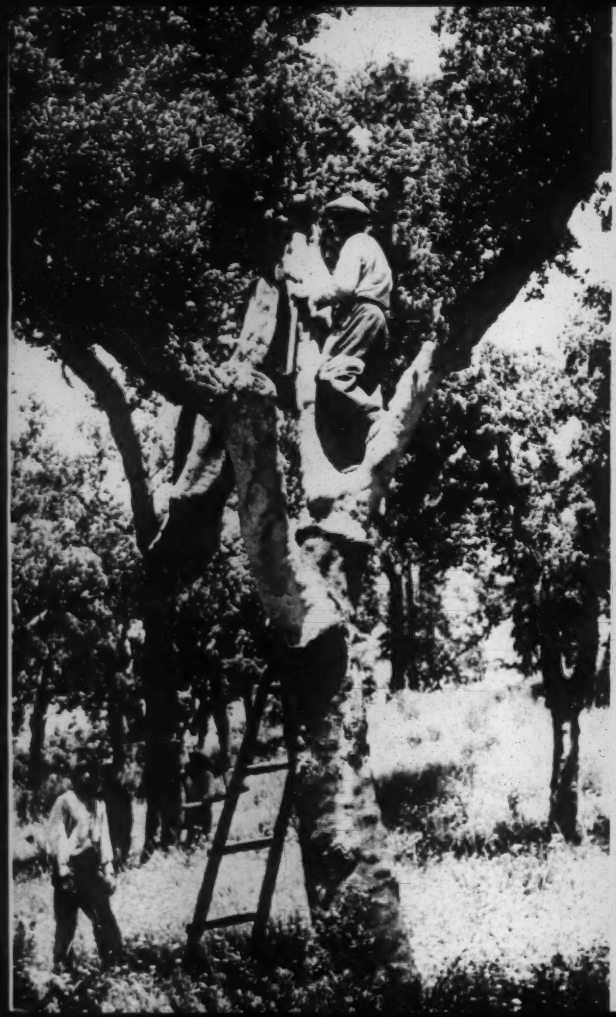

CLEMENT E. CONGER

tuguese-built fort still guards, as it has for four centuries, the ancient harbor of Mombasa in Kenya. Another stands in the Maldive Islands. Portuguese ruins lie at Malacca in Malaya, on an island off the coast of Burma, near Chittagong in East Pakistan. Portuguese names front shops in Zanzibar, Colombo, Calcutta, and Dar es Salaam.

Beyond Portugal's beaches, the rectangular nation blends geographically with its neighbor, Spain. Its main rivers rise in Spain, its highlands extend from Spanish plateaus. During its early days it was part of Spain.

Moors from Africa once ruled these regions. They invaded the peninsula in 714. A French knight, Henry of Burgundy, traveled to Spain to help expel the North Africans. For his labors he was made Count of Portugal in 1095. His domain encompassed the northern section of today's nation. Gradually his descendants pushed south, ousted the Moslems, and by mid-12th century Portugal was free not only of Moors, but of Spain.

The Portuguese language derives from the same tongue as Spanish—spoken Latin introduced by the Romans in the late centuries before Christ. It resembles Spanish, but pronunciation, spelling, and grammar differ.

Today Portugal holds some 8,900,000 people. Most of those that aren't

Henry's first task was to improve navigation. To Sagres he called the century's foremost mathematicians, astronomers, pilots, mariners, shipbuilders. They labored to improve charts and shipboard instruments, to devise better astronomical tables, to make frail ships more seaworthy, and to inspire men to risk the deep.

Prince Henry's scientists realized it was possible to sail west to India, and they probed as far as the Azores. How much farther they went we do not know. But only 24 years after Henry's death, the Portuguese court had learned enough about land blocking the western route to the Indies to turn down Columbus eight years before he sailed.

Henry chose to send his men east to India by routing them south along the west coast of Africa and around (he hoped) the tip of that continent, as yet undiscovered.

Ship after ship put out from Lagos or Lisbon to venture a few hundred miles or so, only to return with fearsome stories. It took Henry 19 years to get a ship past Cape Bojador, just south of the Canary Islands.

For years the Prince's voyages were called expensive absurdities. Still he sent his little ships out, spending all the revenue of his province—money from tuna fishing, fruit trees, and grain.

NATIONAL GEOGRAPHIC PHOTOGRAPHER VOLKMAR WENTZEL

Heirs to Prince Henry's seafaring legacy, Portuguese cadets practice sail handling aboard the *Sagres* at Lisbon.

In 1441, tropical Cap Blanc was reached. In 1445 Dinis Dias rounded Cape Verde. Alvaro Fernandez nearly made it to Sierra Leone a year later. The discovery of the Cape Verde Islands followed.

Then the ships sailed east, beyond the bulge of Africa, past the Ivory Coast, Gold Coast, and Slave Coast, only to find land again stretching infinitely on.

Prince Henry died in 1460. In 1488 the Portuguese Bartholomeu Dias rounded the Cape of Good Hope. Ten years later Vasco da Gama sailed to India.

Trading ships and empire builders followed. Portuguese settlements sprang up around the world. L.B.

See the story by Alan Villiers in the November 1960 *National Geographic*.

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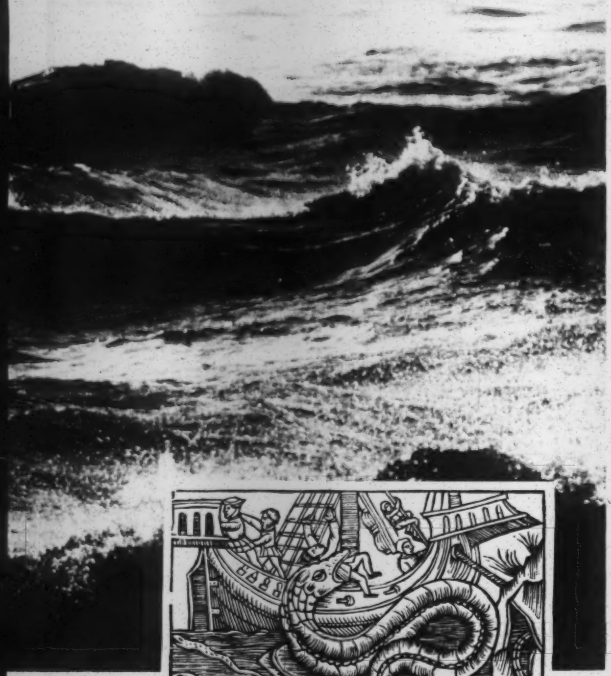


NATIONAL GEOGRAPHIC PHOTOGRAPHER THOMAS NEBBIA

Prince Henry the Navigator

WHEN PORTUGAL set out to master the sea, much of the world was unexplored and unknown. Few ships ventured out of land's sight. Horrible monsters, sailors feared, awaited any who sailed off into the gray mists. All knew that to the south lay regions where the sea boiled. What charts there were bore notations: "... beyond this point one should not go" or "Here the water ends." The unwary might slide over to the underside of the earth—from which there was no return.

The man who dispelled these fears and opened a new age was not a swashbuckling sailor, but a quiet scholar. He sailed no farther than across the Mediterranean on short crusades to North Africa.

Yet his imagination wandered to the ends of the earth. Prince Henry the Navigator—shown in the portrait above—and his fearless captains initiated the enlightened Age of Exploration in which we still live.

Little is known about Henry's life. Fourth son of King John I of Portugal, he was born in 1394 at Pôrto, beside the sea, left. For his courage and leadership in the capture of Ceuta in North Africa from the Moors in 1415, he won knighthood.

He was later granted the province of Algarve, a green land of almond trees and orange groves. He could have become a playboy prince or continued his brilliant military career. Instead, he retired to a rocky cape known as Sagres Point, at Portugal's—and Europe's—southwestern tip.

His personal wants were simple—a chapel, a lookout, a rough bed. He focused his energy on a school for navigators, the first of its kind in Europe. His aims were several: to increase geographic knowledge, extend Portuguese trade, discover the extent of Moslem power, spread Christianity, and open a sea route from western Europe to Asia.

since its size indicated that it was for a great sum, why wouldn't the bank cash it for him?

Occasionally, bottle-finders do collect. A farm boy in the Azores got $1,000 when he located a message that had been dropped near New York harbor as a publicity stunt. Some oceanographic projects reward finders with small sums, say a half dollar.

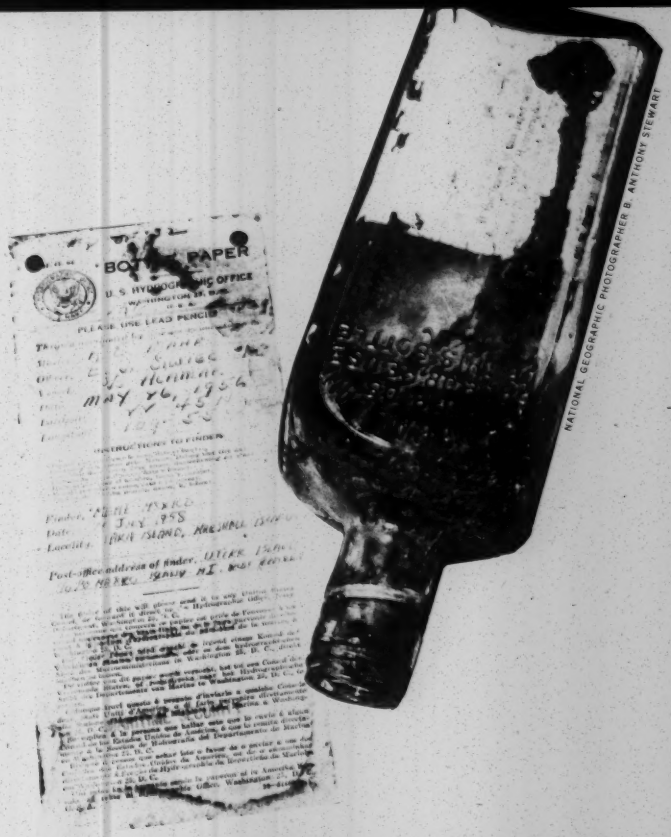
Romance has sprung from a storm-tossed bottle. On Christmas, 1945, a lonely American soldier returning from Europe on a Liberty ship penned a wistful note, sealed it in an aspirin bottle and dropped it into the Atlantic. Nine months later, he received a letter from an Irish milkmaid who had found the bottle. For six years the two corresponded, and finally the American flew to Ireland to meet his pen-pal. Although the whole village expected them to marry, things did not go as well in person as they had by mail, and the American returned alone.

Bottles have carried clues to the fate of vanished ships, even state secrets. In 1560 an English boatman found such a secret in a bottle. Queen Elizabeth I promptly appointed an official Uncorker of Bottles, and made it illegal for other persons to read bottle messages.

If you find a bottle on the beach today there's a good chance it will contain religious counsel. Clergymen on both the Atlantic and Pacific coasts seal sermons and tracts in glass and set them adrift. Especially active in this work is an organization in Liverpool, England, the Merseyside Bottle Evangelists.

The longest known drift of a bottle message was 10,000 miles from Cape Horn to the west coast of North Island, New Zealand. Voyages of 4,000 to 6,000 miles by these fragile messengers are not rare.

Although most major ocean currents have long since been mapped, there remain mysteries. For example, 10 bottles were dropped from a ship near St. Peter and St. Paul Rocks in the Atlantic in 1928. Only two were recovered—one on the west coast of Africa, one on the east coast of South America. Why did one go west and the other east? Bottle oceanographers hope to find out. F.S.



Barnacled bottle floated at least 5,300 miles in two years before reaching the Marshall Islands. Its course from the west coast of Mexico verified the westerly drift of the North Equatorial Current.

Floating Bottles Trace Ocean Currents for Science

UPI

IN AN AGE of earth satellites, atomic physics, electronics, and rockets to the moon, science is still throwing bottles overboard and hoping someone, somewhere, will find them.

In literature—and in fact—floating bottles have often been the last recourse of the castaway sailor or the stranded explorer. But now they are used chiefly to track ocean currents. The sailors at left are casting messages into the sea from the United States Coast and Geodetic Survey ship *Explorer*. Each bottle bears a notation—in English, French, Spanish, and Japanese—asking the finder to mail the postcard inside. *Explorer* left a bobbing wake of bottles on a voyage from Seattle through the Panama Canal to Norfolk, Virginia.

Other containers are dropped from Navy and merchant ships by officers who cooperate with the Navy Hydrographic Office. Whenever they come across an empty bottle, they insert a "bottle paper," a slip carrying the name and position of the ship when the bottle was dropped. The nuclear submarine *Triton,* on its famous submerged voyage around the world, joined in the program, releasing bottles underwater.

Instructions in eight languages—including Esperanto—ask return of the slip with the finder's name and location. Beachcombers do send in the slips, often in the belief that a substantial reward will be sent—although the paper states that no payment can be made.

Some are quite specific in what they want, usually money. One young lady wrote in suggesting that the hydrographic office find her a husband—preferably fat, because "fat men are more jolly, generous, and romantic."

Hydrographic at one time did make token rewards—charts of the areas in which the bottles were found. This led to the sad disillusionment of Mohamed Mustapha, who found a bottle in the Red Sea. Unable to read any of the languages printed on the paper, he mounted his camel and rode across the desert to the nearest British agent. The agent tried to explain, then mailed the paper to Washington. Two months later Mohamed came back, furious, waving a large piece of paper—a chart of his native waters. Since it was clearly an official draft on the United States government, and

Winter Grips the Great Lakes

WITH MASSIVE DAMS and locks the United States and Canada have conquered the rapids of the St. Lawrence, solved the uneven water levels of the Great Lakes, and transformed inland cities to seaports.

But they have not been able to best the final enemy—winter. Cold has grasped the Seaway, strangling the "American Mediterranean."

The mighty ore boats and grain carriers are docked, awaiting spring's return and another bustling season of carrying in eight months goods enough for twelve.

Next March, even though some ice remains, the fleet will sail—perhaps to be trapped like the ships at left in Lake Superior's Whitefish Bay. An April gale packed drift ice around them. Smoke from their stacks indicates that steam is up, ready for a quick start when the pack opens.

November's rush to port is hampered by savage storms and winds, as if the Great Lakes were deliberately trying to slow the movement. Many ships have been lost.

On November 18, 1958, a 60-mile-an-hour windstorm on Lake Michigan wrecked a 630-foot freighter. Only 2 of the 35 crewmen lived to describe the horror.

The freeze comes immediately after the storm. In the northern portion of the Great Lakes, ice closes passages rapidly. A resolute captain who tries to get one more load of grain, oil, coal, or steel to an industrial port may find his ship suddenly jammed by ice. Thirteen vessels were trapped this way in 1958. It took weeks of effort by icebreakers to rescue them.

The closing of the Welland Canal, the passage between Lake Erie and Lake Ontario, usually signals the end of traffic in the Seaway and the southern portion of the Great Lakes. However, for the first time in history icebreakers managed to keep open the harbor of Quebec City all winter in 1959.

During the freezing months, the vast water route becomes a popular playground for ice fishermen and skaters.

The annual icebreakers' race in March starts another season. From the Gulf of St. Lawrence the powerful boats inch their way upriver to Montreal. Meanwhile, other icebreakers perform the same task on the Great Lakes. In the picture above, the massive prow of an icebreaker assaults the frozen channel to Montreal. Workers and spectators including a priest on skis (left) watch its progress. The small fir trees stuck in the snow mark a wintertime road over the ice.

LOUIS JAQUES

There is hope for eventually winning against winter. Engineers are studying a technique successfully tested near St. John, New Brunswick, and Thule, Greenland, which melts surface ice by raising warmer water from the bottom on air bubbles. But the cost of equipping the Seaway is an estimated $838,000,000—enough to discourage early installation. F. S.

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ICEBOUND ON LAKE SUPERIOR—Under banked clouds, 28 Great Lakes cargo ships wait for weather or icebreakers to loosen winter's clutch

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